

A. Course Handout (Version 1.0)

Institute/School Name	Chitkara University Institute of Engineering and Technology		
Department Name	Department of Computer Science & Engineering		
Programme Name	Bachelor of Engineering (B.E.), Computer Science & Engineering		
Course Name	Java Programming	Session	2024-2025
Course Code	22CS031	Semester/Batch	5 th /2022
L-T-P (Per Week)	2-0-4	Course Credits	04
Course Coordinator	Ms. Shivani Wadhwa		

CLO01	Understand the features of Java such as operators, classes, objects, inheritance, packages and exception handling
CLO02	Learn latest features of Java like garbage collection, Abstract methods, Network interface
CLO03	Acquire competence in Java using multithreading, Generic, and Collection Framework
CLO04	Get exposure to advance concepts of Database connectivity like JDBC

1. Objectives of the Course

The scope of the course is to provides the foundation for understanding the key aspects of java programming and implementation obtaining a theoretical understanding of advance programming concepts. The objectives of the course are:

- to provide a comprehensive understanding of Java's syntax, structure, and fundamental programming concepts
- to build an understanding of analysing and evaluating real-world problems.
- to inculcate the skill in students to design, implement, and test Java applications efficiently.
- to equip students with the knowledge and skills necessary to create efficient, robust, and scalable software solutions using Java

2. Course Learning Outcomes

After completion of the course, student should be able to:

	Course Learning Outcome	*POs	**CL	***KC	Sessions
CLO01	Understand the features of Java such as operators, classes, objects, inheritance, packages and exception handling	PO1, PO2, PO4, PO3, PO5, PO6, PO11	K1	Conceptual Procedural	28
CLO02	Learn latest features of Java like garbage collection, Abstract methods, Network interface	PO1, PO4, PO5, PO12	K2	Conceptual Procedural	15
CLO03	Acquire competence in Java using multithreading, Generic, and Collection Framework	PO1, PO2, PO3, PO4, PO5, PO10, PO11	K4	Conceptual Procedural	32

CLO04	Get exposure to advance concepts of Database connectivity like JDBC	PO3, PO4, PO5, PO9, PO10, PO11	K4	Procedural	15
Total Contact Hours					90

Revised Bloom's Taxonomy Terminology

* PO's available at (shorturl.at/cryzF)

**Cognitive Level =CL

***Knowledge Categories = KC

Course Learning Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CLO01	H	H	H	H	H	M					H	
CLO02	H			H	H							H
CLO03	H	H	H	H	H					M	H	
CLO04			H	H	H				M	M	H	

H=High, M=Medium, L=Low

3. ERISE Grid Mapping

Feature Enablement	Level (1-5, 5 being highest)
Entrepreneurship	1
Research	3
Innovation	4
Skills	5
Employability	5

4. Recommended Books:

Textbooks:

B01: "Head First Java" by Kathy Sierra and Bert Bates, Shroff, 2nd Edition, 2009.

B02: "Thinking in Java" by Bruce Eckel President, MindView, Inc., Fourth Edition, 2006.

B03: "Java: A Beginner's Guide" by Herbert Schildt, McGraw-Hill Education, 9th Edition, 2022.

B04: "JAVA: THE COMPLETE REFERENCE" by Herbert Schildt McGraw Hill Education 7TH EDN, 2017

B05: "Java for Programmers " by P.J.Deitel and H.M.Deitel, PEA (or) Java, Prentice Hall, 2009.

Reference Books:

B03: "Java: A Beginner's Guide" by Herbert Schildt, McGraw-Hill Education, 9th Edition, 2022.

E-Resources:

- <https://library.chitkara.edu.in/subscribed-books.php>

5. Other readings and relevant websites:

Serial No	Link of Journals, Magazines, websites and Research Papers
1.	https://www.javatpoint.com/method-overloading-vs-method-overriding-in-java
2.	https://www.javatpoint.com/wrapper-class-in-java
3.	https://www.geeksforgeeks.org/java-exercises/#pattern-programs-in-java
4.	https://www.youtube.com/watch?v=sqdOAjjBMFc&list=PLYIskOUYCZsjfHeNJbD4na3cbxzNWw2Q
5.	https://www.codecademy.com/resources/blog/advanced-java-code-challenges/
6.	https://www.youtube.com/watch?v=yNpRDGGZtO4

6. Recommended Tools and Platforms

Code Quotient

7. Course Plan:

Lecture Number	Topics	Textbook
1-2	Introduction to JAVA: Java Introduction, History and goals of Java, Fundamentals of OOPs	B03-Chpater-1
3-4	Overview of JDK, JVM, Garbage Collection	B03-Chapter-1
5-6	Java Basics: Identifiers, Keywords, Java Data Types & Operators	B03-Chapter-1
7-8	Practice Problem: Aggregate and Percentage Marks of a student, Gross salary of an employee, Add one to each digit of a 4 digit, Add one to each digit of a 4 digit	B03-Chapter-2
9-10	Control Statements: Decision Constructs, Using Loop Constructs	B03-Chapter-3
11-12	Command Line Arguments	B03-Chapter-3
13-14	Practice Problems: The Number is Kaprekar or not, Generate first n Prime numbers, Next Closest Fibonacci Number	B03-Chapter-4
15-16	Working with Arrays: Creating and Using Arrays (1D, 2D, Multidimensional)	B03-Chapter-5
17-18	Jagged Arrays	B03-Chapter-5
19-20	Practice Problems: Matrix Multiplication, spirally traversing a matrix, Rotate a 2-D array by 90 degrees	B03-Chapter-5
21-22	Classes & Objects: Classes, objects and methods: defining a class	B03-Chapter-6
23-24	Access Control, Method overloading	B03-Chapter-6

25-26	Practice Problems: Convert given number of seconds to days, hours, minutes and second, Class- TimeSpan, class – BankFee	B03-Chapter-6
27-28	Constructors, constructor overloading, use of this and static.	B03-Chapter-6
29-30	Practice Problems: Class – TollBooth, methods of class: Display of Strings	B03-Chapter-6
31-32	Inheritance: Working with Inheritance: Inheritance Basics & Types, Using super, Method Overriding	B03-Chapter-7
33-34	Dynamic method dispatch, final keyword	B03-Chapter-7
35-36	Practice Problems: class – Box, BookCD, Marketer	B03-Chapter-7
37-38	Abstract Methods & Classes, Packages & Interfaces: Built-In Packages and User Defined Packages	B03-Chapter-8
ST-1 Syllabus (Lecture number 1- 38)		
39-40	Interfaces: Declaration, Implementation, Extending Classes and Interfaces	B03-Chapter-8
41-42	Practice Problem: Class - Customer and BankAccount, Class - MovablePoint and MovableCircle, Class: Circle and ResizableCircle	B03-Chapter-8
43-44	Strings, StringBuffer, StringBuilder & StringTokenizer: Introduction, Immutable String	B03-Chapter-23
45-46	Methods of String class, String Buffer class & StringBuilder class, toString method, StringTokenizer class	B03-Chapter-23
47-48	Practice Problem: Capitalize the first letter of each word, Swap first and last character of each word in a string, Find occurrences of palindrome words in a string	B03-Chapter-23
49-50	Exception Handling: Exception handling fundamentals, Exception types, try and catch	B03-Chapter-9
51-52	Multiple catch clauses, nested try, throw, throws and finally, Creating custom Exception.	B03-Chapter-9
53-54	Practice Problems: Password too short Exception, Valid email address, Valid index of array	B03-Chapter-9
55-56	Multithreading: Java thread model, main thread, creating thread by implementing Runnable and extending thread class	B03-Chapter-11
57-58	Creating multiple threads, using isAlive() and join(), thread priorities	B03-Chapter-11
59-60	Synchronization	B03-Chapter-11
61-62	Practice Problems: Multithreading Java: Greetings in reverse, Transactions in Account with and without Synchronization	B03-Chapter-11
63-64	Generics: Introduction, Generic Example, Generic Class, Generic Method	B03-Chapter-13
63-65	Generic Constructor and Generic Interfaces	B03-Chapter-13
ST-2 Syllabus (Lecture number 39-65)		

66-67	Collections Framework: Introduction, Collection Interfaces-List, Queue	B04-Chapter-17
68-69	Practice Problems: Duplicate the Queue elements, Number is a Happy number or not	B04-Chapter-17
70-71	Collections Interfaces- Set (Overview), Collection Classes: ArrayList, LinkedList	B04-Chapter-17
72-73	Collections Interfaces- Iterator, Working with Maps (Overview), Comparable & Comparator	B04-Chapter-17
74-75	Practice Problems: Remove duplicates from a vector, Implement Own ArrayList in Java	B04-Chapter-17
76-77	Collections Interfaces- Arrays, Vector, Stack	B04-Chapter-17
78-79	Practice Problems: Cut the chocolate smartly for maximum pieces, find all pairs with sum K, Product Array - Ignoring the next	B04-Chapter-17
80-82	IO Streams: Stream Classes: Byte Streams, Character Streams, StreamTokenizer.	B03-Chapter-10
83-85	Practice Problems: Capitalize First Letter of every Word in a File, Strip HTML tags from a file	B03-Chapter-10
86-88	JDBC Connectivity: Introduction, Architecture of JDBC Database Connection.	B04-Chapter-31
89-90	JDBC Connectivity: Establishing JDBC Database Connection.	B04-Chapter-31
ETE (Syllabus = (Lecture number 1-90))		

8. Delivery/Instructional Resources

Lecture No.	Topics	Web References	Audio-Video
1-2	Introduction to JAVA: Java Introduction, History and goals of Java, Fundamentals of OOPs	https://www.geeksforgeeks.org/introduction-to-java/	https://www.youtube.com/watch?v=AEo4KgwKY0U&list=PLqleLpAMfxGCbdaj6SoExDfHrTfRDeWeG
3-4	Overview of JDK, JVM, Garbage Collection	https://www.baeldung.com/jvm-garbage-collectors	https://www.youtube.com/watch?v=VHbSopMyc4M&list=PLBlnK6fEyyqRjicb0pe9mrbrXZ36V7WkyJ
5-6	Java Basics: Identifiers, Keywords, Java Data Types & Operators	https://www.geeksforgeeks.org/java-basic-syntax/?ref=lbp	https://www.youtube.com/watch?v=EUKsHFJ28WQ
7-8	Practice Problem: Aggregate and Percentage Marks of a student, Gross salary of an employee, Add one to each digit of a 4 digit, Add one to each digit of a 4 digit	https://www.geeksforgeeks.org/java-program-to-illustrate-total-marks-and-percentage-calculation/	https://www.youtube.com/watch?v=r4cFT9_kZlc

9-10	Control Statements: Decision Constructs, Using Loop Constructs	https://www.geeksforgeeks.org/decision-making-java-if-else-switch-break-continue-jump/?ref=lbp	https://www.youtube.com/watch?v=OUZkdKFeuK0&list=PLlhM4lkb2sEgQmNKO43i7v60no4bdc3ll
11-12	Command Line Arguments	https://www.javatpoint.com/command-line-argument	https://www.youtube.com/watch?v=Up17-azeuyE
13-14	Practice Problems: The Number is Kaprekar or not, Generate first n Prime numbers, Next Closest Fibonacci Number	https://www.geeksforgeeks.org/kaprekar-number/	https://www.youtube.com/watch?v=nR4gjD4193Q
15-16	Working with Arrays: Creating and Using Arrays (1D, 2D, Multidimensional)	https://www.geeksforgeeks.org/arrays-in-java/?ref=lbp	https://www.youtube.com/watch?v=kWJHzambtNo
17-18	Jagged Arrays	https://www.geeksforgeeks.org/jagged-array-in-java/	https://www.youtube.com/watch?v=6A5SRl1VwbE
19-20	Practice Problems: Matrix Multiplication, spirally traversing a matrix, Rotate a 2-D array by 90 degrees	https://www.javatpoint.com/java-program-to-multiply-two-matrices	https://www.youtube.com/watch?v=BtDPVc7H1Zs
21-22	Classes & Objects: Classes, objects and methods: defining a class	https://www.geeksforgeeks.org/object-oriented-programming-oops-concept-in-java/?ref=lbp	https://www.youtube.com/watch?v=W-D71ZeMixQ&list=PLBlNk6fEYqRiwWLBsXKfTdGV8OVqr9dZr
23-24	Access Control, Method overloading	https://www.geeksforgeeks.org/method-overloading-in-java/	https://www.youtube.com/watch?v=KpwBVAYbPDA
25-26	Practice Problems: Convert given number of seconds to days, hours, minutes and second, Class-TimeSpan, class – BankFee	https://www.w3resource.com/java-exercises/basic/java-basic-exercise-55.php	https://www.youtube.com/watch?v=ESSxoH-Rq1o
27-28	Constructors, constructor overloading, use of this and static.	https://www.geeksforgeeks.org/copy-constructor-in-java/?ref=lbp	https://www.youtube.com/watch?v=HbQ2ASDc0Lw
29-30	Practice Problems: Class – TollBooth, methods of class: Display of Strings	https://www.geeksforgeeks.org/java-string-exercise/	https://www.youtube.com/watch?v=sCdgyAcQD5o
31-32	Inheritance: Working with Inheritance: Inheritance Basics & Types, Using super, Method Overriding	https://www.geeksforgeeks.org/inheritance-and-constructors-in-java/?ref=lbp	https://www.youtube.com/watch?v=XSuybcFfLx4

33-34	Dynamic method dispatch, final keyword	https://www.scaler.com/topics/runtime-polymorphism-in-java/	https://www.youtube.com/watch?v=sg9a0bFbiwo
35-36	Practice Problems: class – Box, BookCD, Marketer	https://coderanch.com/t/662496/java/book-library-class	https://www.youtube.com/watch?v=LuEtPdGkYG4
37-38	Abstract Methods & Classes, Packages & Interfaces: Built-In Packages and User Defined Packages	https://www.geeksforgeeks.org/abstract-methods-in-java-with-examples/?ref=lbp	https://www.youtube.com/watch?v=9xLGd6EGvIE
39-40	Interfaces: Declaration, Implementation, Extending Classes and Interfaces	https://www.geeksforgeeks.org/differences-between-interface-and-class-in-java/?ref=lbp	https://www.youtube.com/watch?v=sC2DMPzIPFo
41-42	Practice Problem: Class - Customer and BankAccount, Class - MovablePoint and MovableCircle, Class: Circle and ResizableCircle	https://www.javatpoint.com/banking-application-in-java	https://www.youtube.com/watch?v=mp1_F7lfmNE
43-44	Strings, StringBuffer, StringBuilder & StringTokenizer: Introduction, Immutable String	https://www.digitalocean.com/community/tutorials/string-vs-stringbuffer-vs-stringbuilder	https://www.youtube.com/watch?v=GnpEm89Y0fg&list=PLd3UqWTnYXOlrdBwt2DTnF3u3W-1Kozk0
45-46	Methods of String class, StringBuffer class & StringBuilder class, toString method, StringTokenizer class	https://www.geeksforgeeks.org/stringbuffer-class-in-java/	https://www.youtube.com/watch?v=GnpEm89Y0fg&list=PLd3UqWTnYXOlrdBwt2DTnF3u3W-1Kozk0
47-48	Practice Problem: Capitalize the first letter of each word, Swap first and last character of each word in a string, Find occurrences of palindrome words in a string	https://www.geeksforgeeks.org/swap-the-first-and-last-character-of-a-string-in-java/	https://www.youtube.com/watch?v=aamS7jTsa4k
49-50	Exception Handling: Exception handling fundamentals, Exception types, try and catch	https://www.geeksforgeeks.org/exceptions-in-java/?ref=lbp	https://www.youtube.com/watch?v=y-NlCxiKY&list=PLlhM4lkb2sEjaU-JAASDG4Tdwpf-JFARN
51-52	Multiple catch clauses, nested try, throw, throws and finally, Creating custom Exception.	https://www.geeksforgeeks.org/try-catch-throw-and-throws-in-java/?ref=lbp	https://www.youtube.com/watch?v=To6tsfRADL4
53-54	Practice Problems: Password too short Exception, Valid email address, Valid index of array	https://www.geeksforgeeks.org/java-program-to-check-the-validity-of-a-password-using-user-defined-exception/	https://www.youtube.com/watch?v=h0lGGZbK9zE

55-56	Multithreading: Java thread model, main thread, creating thread by implementing Runnable and extending thread class	https://www.javatpoint.com/multithreading-in-java	https://www.youtube.com/watch?v=YDH7f9dT XAs
57-58	Creating multiple threads, using isAlive() and join(), thread priorities	https://www.studytonight.com/java/joining-a-thread.php	https://www.youtube.com/watch?v=b3C3ODu mC24
59-60	Synchronization	https://www.javatpoint.com/synchronization-in-java	https://www.youtube.com/watch?v=Qf1DuRM PbOA
61-62	Practice Problems: Multithreading Java: Greetings in reverse, Transactions in Account with and without Synchronization	https://www.geeksforgeeks.org/reverse-a-string-in-java/	https://www.youtube.com/watch?v=0nDYk8sV _jQ
63-64	Generics: Introduction, Generic Example, Generic Class, Generic Method	https://www.geeksforgeeks.org/generic-class-in-java/	https://www.youtube.com/watch?v=- 5t9oOYBlmc
63-65	Generic Constructor and Generic Interfaces	https://www.geeksforgeeks.org/generic-constructors-and-interfaces-in-java/	https://www.youtube.com/watch?v=zpXFopIKfr c
66-67	Collections Framework: Introduction, Collection Interfaces- List, Queue	https://www.javatpoint.com/collections-in-java	https://www.youtube.com/watch?v=VphowcSk BX4
68-69	Practice Problems: Duplicate the Queue elements, Number is a Happy number or not	https://www.geeksforgeeks.org/handle-duplicate-elements-in-a-priorityqueue-while-maintaining-order-in-java/	https://www.youtube.com/watch?v=SD- qXsIVu5c
70-71	Collections Interfaces- Set (Overview), Collection Classes: ArrayList, LinkedList	https://www.geeksforgeeks.org/arraylist-in-java/?ref=lbp	https://www.youtube.com/watch?v=VphowcSk BX4
72-73	Collections Interfaces- Iterator, Working with Maps (Overview), Comparable & Comparator	https://www.javatpoint.com/java-map	https://www.youtube.com/watch?v=r13VklTC0e A&list=PLd3UqWTnYXOk VR3OR9UZGyEt9RFUbaT MZ
74-75	Practice Problems: Remove duplicates from a vector, Implement Own ArrayList in Java	https://www.geeksforgeeks.org/how-to-remove-duplicate-elements-from-the-vector-in-java/	https://www.youtube.com/watch?v=QmNsqVi0 B8U

76-77	Collections Interfaces- Arrays, Vector, Stack	https://www.javatpoint.com/java-vector	https://www.youtube.com/watch?v=r13VklTC0eA&list=PLd3UqWTnYXOkVR3OR9UZGyEt9RFUbaTMZ
78-79	Practice Problems: Cut the chocolate smartly for maximum pieces, Find all pairs with sum K, Product Array - Ignoring the next	https://www.geeksforgeeks.org/print-all-pairs-with-given-sum/	https://www.youtube.com/watch?v=5L9Jrehvow
80-82	IO Streams: Stream Classes: Byte Streams, Character Streams, StreamTokenizer.	https://www.clear.rice.edu/comp212/00-fall/tutorials/09/io.html	https://www.youtube.com/watch?v=Uifd8FATQiY
83-85	Practice Problems: Capitalize First Letter of every Word in a File, Strip HTML tags from a file	https://www.geeksforgeeks.org/java-program-to-capitalize-the-first-letter-of-each-word-in-a-string/	https://www.youtube.com/watch?v=xz8j1esbOAQ
86-88	JDBC Connectivity: Introduction, Architecture of JDBC Database Connection	https://www.geeksforgeeks.org/introduction-to-jdbc/	https://www.youtube.com/watch?v=Lp-g6UJSxtk
89-90	JDBC Connectivity: Establishing JDBC Database Connection.	https://www.geeksforgeeks.org/establishing-jdbc-connection-in-java/	https://www.youtube.com/watch?v=7v2OnUti2eM

9. Action plan for different types of learners

Slow Learners	Average Learners	Fast Learners
<ul style="list-style-type: none"> Remedial Classes on Saturdays Encouragement for improvement using Peer Tutoring Use of Audio and Visual Materials Use of Real-Life Examples 	<ul style="list-style-type: none"> Workshops Formative Exercises used to highlight concepts and notions E-notes and E-exercises to read ahead of the pedagogic material. 	<ul style="list-style-type: none"> Engaging students to hold hands of slow learners by creating a Peer Tutoring Group Design solutions for complex problems Design solutions for complex problems Presentation on topics beyond those covered in CHO

10. Evaluation Scheme & Components:

Evaluation Component	Type of Component	No. of Assessments	Weightage of Component	Mode of Assessment
Component 2	Subjective Test/Sessional Tests (STs)	02*	40%	Online on-campus
Component 3	End Term Examinations	01**	60%	Online on-campus
Total		100%		

*Best 1 Sessional Test will be counted for final assessment.

**As per Academic Guidelines, a minimum of 75% attendance is required to appear for the End Term Examination.

11. Syllabus of the Course:

Subject: Java Programming / 22CS031	
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S. No.	Topic (s)	No. of Sessions	Weightage %
1	Introduction to JAVA: Java Introduction, History and goals of Java, Fundamentals of OOPs, Overview of JDK, JVM, Garbage Collection, Java Basics: Identifiers, Keywords, Java Data Types & Operators, Control Statements: Decision Constructs, Using Loop Constructs, Command Line Arguments, Working with Arrays: Creating and Using Arrays (1D, 2D, Multidimensional), Jagged Arrays, Classes & Objects: Classes, objects and methods: defining a class, Access Control, Method overloading, constructors, constructor overloading, use of this and static, Inheritance: Working with Inheritance: Inheritance Basics & Types, Using super, Method Overriding, Dynamic method dispatch, final keyword, Abstract Methods & Classes, Packages & Interfaces: Built-In Packages and User Defined Packages.	38	40%
ST-1 (Covering 40% syllabus)			
2	Interfaces: Declaration, Implementation, Extending Classes and Interfaces. Strings, StringBuffer, StringBuilder & StringTokenizer: Introduction, Immutable String, Methods of String class, String Buffer class & StringBuilder class, toString method, StringTokenizer class. Exception Handling: Exception handling fundamentals, Exception types, try and catch, multiple	27	40%

	<p>catch clauses, nested try, throw, throws and finally, Creating custom Exception.</p> <p>Multithreading: Java thread model, main thread, creating thread by implementing Runnable and extending thread class, creating multiple threads, using isAlive() and join(), thread priorities.</p> <p>Synchronization</p> <p>Generics: Introduction, Generic Example, Generic Class, Generic Method, Generic Constructor and Generic Interfaces.</p>		
ST-2 (Covering 40% syllabus)			
3	<p>Collections Framework: Introduction, Collection Interfaces-List, Queue, Set (Overview), Collection Classes: ArrayList, LinkedList, Iterator, Working with Maps (Overview), Comparable & Comparator, Arrays, Vector, Stack.</p> <p>IO Streams: Stream Classes: Byte Streams, Character Streams, StreamTokenizer.</p> <p>JDBC Connectivity: Introduction, Architecture of JDBC Database Connection, Establishing JDBC Database Connection.</p>	20	20%
End Term 100% syllabus			

This Document is approved by:

Designation	Name	Signature
Course Coordinator	Ms. Shivani Wadhwa	
Head-Academic Delivery	Dr. Susheela Hooda	
Dean	Dr. Rupali Gill	
Dean Academics	Dr. Monit Kapoor	
Date	23.07.2024	